United States Department of the Interior
FISH AND WILDLIFE SERVICE
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IN REPLY REFER TO:
FWS/EC-03-047

MAY - 2 2003

Mr. Andrew Dick
Department of the Navy
Southwest Division
Naval Facilities Engineering Command
1220 Pacific Highway
San Diego, California 92132-5190

Dear Mr. Dick:

Subject: Comments on the Draft Remedial Investigation Report, Skeet Range, Alameda Point, California

Thank you for providing the U.S. Fish and Wildlife Service (Service) with the opportunity to comment on the draft Skeet Range Remedial Investigation Report for Alameda Point. We appreciate the Navy's efforts to address the concerns of the Service regarding potential exposure of diving ducks to lead shot in the off-shore sediments in the vicinity of the skeet range. Having completed a review of the draft document, we have the following suggestions to refine the methods employed in the Ecological Risk Assessment:

No Observed Adverse Effect Level (NOAEL). Page 76. The NOAEL for lead shot used for the risk assessment is developed from feeding studies in which, with the exception of one study, birds were given a single dose of a specified number of lead shot. This approach does not account for continued re-exposure in foraging wild ducks, where the number of shot ingested per day are potentially renewed by daily feeding. Of the cited studies, the one closest to this situation was that of Rattner et al. (1989), where the birds were dosed with additional shot at day 14. The NOAEL number from this study was about 0.20 to 0.40 lower than the recommended NOAEL derived from Sanderson (2002), suggesting that the NOAEL of nine shot used for the risk assessment should be adjusted downward by a factor of at 0.2 to 0.40, or two to four shot, with a Lowest Observed Adverse Effect Level (LOAEL) of three to five shot.

The Probability of Ingesting Less Than or Equal to the NOAEL. Page 79. Equation 4-3 calculates the probability, using a binomial model, that an individual bird will ingest up to and including the NOAEL number of lead shot particles (r) in a given number of probes (n). The term P_r should also be added to the value of $P(y \leq r)$ in equation 4-3.

The Value of "*n*". Page 79. Equation 4-5 uses three parameters to calculate *n*, the number of probes for grit that a bird makes in a specified time period. These parameters are the amount of grit ingested, site use, and grit/shot retention time. Two of these parameters can be better refined to reduce the uncertainties associated with the binomial probability model.

Site Use. Page 81. Given the sensitivity of the model conclusions to the Site Use Factor (SUF), an effort to refine the SUF is warranted. The approach of dividing the physical area of the skeet range by the area of the animals' potential home ranges depends on the unrealistic assumption that ducks use space uniformly. As an alternative, we recommended that SUF be estimated from the survey information referenced in the report as having been collected in 1997 for the Ecological Risk Assessment. The SUF can be calculated from those data as follows:

SUF=[(No. of bird*days at skeet range)/(total no. of bird*days in the vicinity of Alameda Point)]*0.63

*Bird*days* are the number of birds surveyed at a specific location times the number of days birds were observed to be present at that location in a given number of survey days. The 0.63 value is a time component that accounts for the reduced number of scoters and scaup in San Francisco Bay during late spring and summer (Cogswell 1977). As a hypothetical example, if 250 scoters were observed at the skeet range during 6 days out of 10 days of surveys, and 2,000 scoters occurred over the entire area and some were present all ten days, then SUF would be calculated as:

SUF=[(250 scoters*6 days)/(2000 scoters*10 days)]*0.63
=(1500 bird*days/20,000 bird*days)*0.63
=0.075*0.63
=0.0473

Note, however, that if the survey data extends across seasons, then the 0.63 time factor would not be used, since small number of non-breeding scoters and scaup potentially occur throughout the summer (Cogswell 1977). This approach, which is a simplified version of the Duck Use Index described by Joyner (1980), makes the best use of available data to help reduce the uncertainty associated with the SUF parameter. It also focuses the analysis on the population of birds that actually use the Alameda Point environs. Separate calculations for scoter and scaup are recommended.

The Value of "i". Page 81. The report uses a range of literature values for grit/shot retention time (i) in equation 4-5. The low value in the range is 4 days, based on a study with mallard ducklings. The mid- and maximum values of 10 and 20 days are based on studies with adult ducks. Since the diving ducks wintering in the central bay are post-fledge juveniles and adults, a low value of 4 days probably underestimates potential grit/shot retention time for these birds. We suggest that the risk assessment use a range of 10 to 20 days with 15 days as the mid-range value. However, entering the retention time directly into equation 4-5 overestimates risk

because it does not effectively account for excretion of grit/shot during the exposure period. If grit and shot are excreted at a constant rate, then a duck would have a revolving inventory of grit/shot that functionally represents the amount ingested that day, plus any remaining from previous days. An example for a 10-day retention time shows the proportion of ingested grit/shot in the bird assuming that one tenth of the daily intake is lost over each of ten successive days as the bird continues to ingest grit and shot on a daily basis:

	Remaining Proportion of Shot/Grit Ingested Day 1 Plus Daily Intake									
Day	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2		0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
3			0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
4				0.70	0.70	0.70	0.70	0.70	0.70	0.70
5					0.60	0.60	0.60	0.60	0.60	0.60
6						0.50	0.50	0.50	0.50	0.50
7							0.40	0.40	0.40	0.40
8								0.30	0.30	0.30
9									0.20	0.20
10										0.10
Proportion of daily intake of grit and shot remaining on any given day										5.50

The same process provides proportions of daily intake remaining on any given day of 8.0 for a 15-day retention time and 10.5 for a 20-day retention time. This relationship can also be described by the equation:

$$i_t=(t+1)/2$$

where i_t=proportion of grit/shot retained and t=retention time in days. We recommend that these values be used in equation 4-5, rather than using the retention time directly, to represent the parameter "i".

Estimated Increase in Duck Mortality from Lead Shot Exposure. The information in Table 4-13 should be used to develop an estimate of the increase in duck mortality associated with exposure scenarios in which the probability of ingesting more than r lead shot is greater than 10^{-3}. This can be accomplished by averaging the values in the "$P(y>r)$" column that exceed 10^{-3} and

multiplying the average by the fraction of trials that produce those probabilities. For example, using the draft data currently in Table 4-13 results in additional mortality (M_A) as follows:

$M_A=(4/27)*[(0.98+0.35+0.0023+0.0015)/4]$
$M_A=0.148*(0.3334)$
$M_A=0.0493$

In this example, the resulting value of M_A exceeds 10^{-3}, indicating a risk to the population of diving ducks in the Alameda Point environs from lead shot exposure in the skeet range. This recommendation assumes that each scenario has an equal probability of occurring; if this is not the case, then weighted averages can be used.

If you have any questions, please contact Mr. James Haas of my Environmental Contaminants Division at (916) 414-6604.

Sincerely,

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Acting Field Supervisor

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